Space Weather Forecast

Issued on Thursday, 23 November 2023 at 13:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Radio Blackouts likely throughout. Chance of G1 Geomagnetic Storms, day 3-4 (25-26 Nov).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with a single low-level Moderate flare from a sunspot group in the northeast. There are currently thirteen sunspot groups on the visible disc, the majority of which are located in the eastern solar hemisphere. The largest group is a new, magnetically complex region in the far southeast. The northeast of the disc contains a cluster of moderately large sunspot groups that appear to be magnetically connected.

One potential Earth-directed Coronal Mass Ejection (CME) has been observed in the past 24 hours. A partial halo CME is evident in solar imagery from 22/2100 UTC onwards, directed mainly southwards. The source region for this is somewhat uncertain, but is speculated to be from the vicinity of the sunspot region approaching centre disc in the southern hemisphere. Confidence is moderate for a CME arrival at Earth from this around 26/0000 UTC.

Solar Wind / Geomagnetic Activity: Solar wind parameters have been indicative of a waning connection to a coronal hole, with wind speeds having fallen from elevated to slightly elevated levels. The interplanetary magnetic field has been at weak levels, but on a declining trend. The important north-south component has varied weakly. Resultant geomagnetic activity was Unsettled to Active (Kp3-4) initially, but eased to become Quiet (Kp1-2) by the end of the 24 hour period.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate with further isolated Moderate-class flares (R1-R2, Minor-Moderate) likely and a slight chance of isolated Strong-class (R3-Strong) flares, mainly from current eastern solar hemisphere sunspot regions.

Solar Wind / Geomagnetic Activity: Two Earth-directed CMEs have been analysed and modelled, likely arriving at Earth day 1-2 (24-25 Nov) and day 2-3 (25-26 Nov).

Earth remains connected to the waning high-speed stream of a coronal hole. Slightly elevated solar winds should ease back to background levels in the next couple of days. No further enhancements are expected at Earth until the arrival of a new coronal hole later on day 3 (25 Nov) or more likely day 4 (26 Nov), with speeds of up to 500-550 km/s possible.

Geomagnetic Activity will be mainly Quiet on day 1 and 2 (23 and 24 Nov), with a chance of isolated Unsettled intervals. Activity should then increase to Active to G1/Minor Storm levels with the arrival of the first CME. This is most likely to occur early on day 3 (25 Nov), but with a slight chance of occurring late day 2 (24 Nov). Activity may briefly ease to Unsettled, then increase once again to mainly Active to G1/Minor Storm levels later day 3 (25 Nov) into day 4 (26 Nov) given combined HSS and further expected CME influences.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	10	50	50
Strong	G3	No	1	1	5	5
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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